ANTHOCYANIN'S POWER

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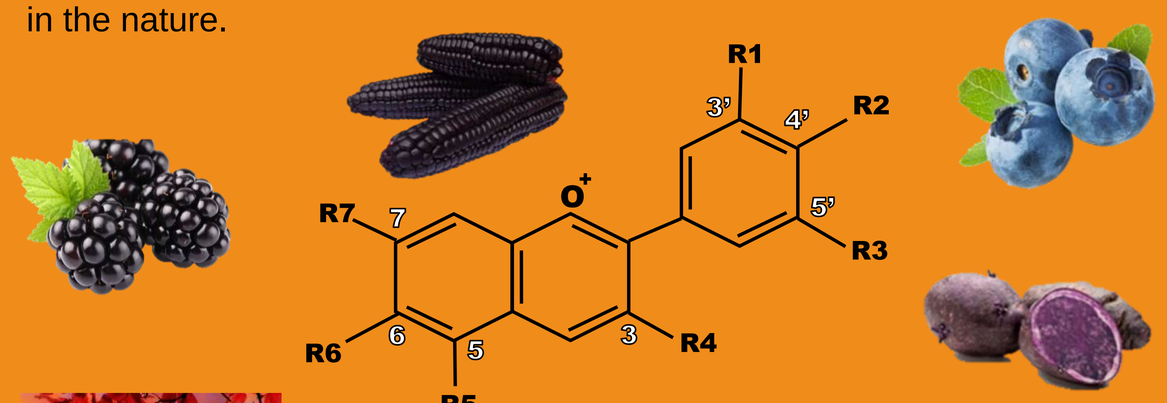
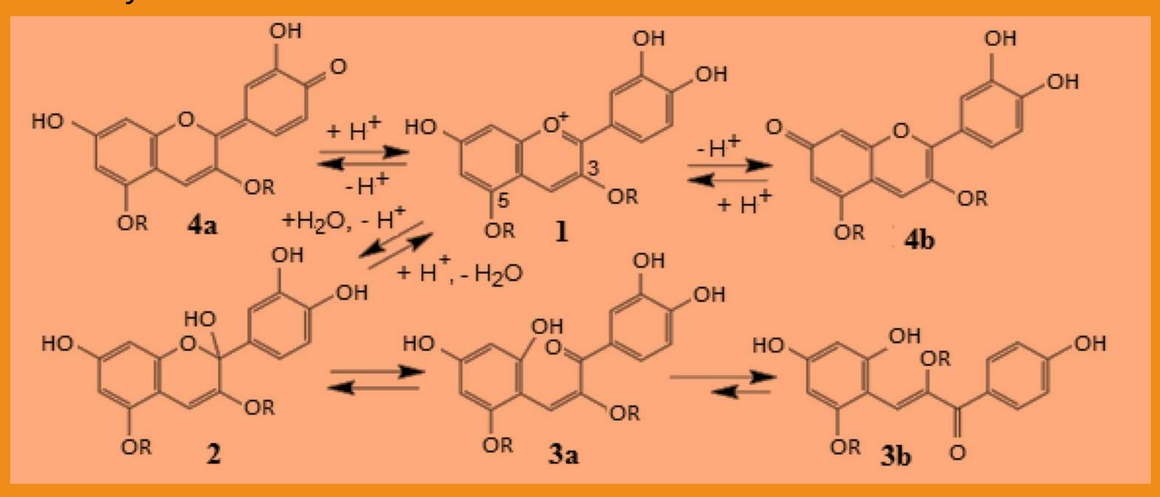
INTRODUCTION

Anthocyanins (of the Greek anthos = flower and kianos = blue) are the most important pigments of the plants. These pigments are responsible of the shiny orange, pink, red, violet and blue colors in the flowers and fruits of some plants. There is a huge variety of the anthocyanins spread in the nature.



Meanwhile red color is a property of the only flavylium form (**1**), that exists predominantly in highly acidic (100% at pH < 1) water solutions. The increase of pH leads to formation of some another forms that are colorless (pseudobase, **2**), slightly colored two chalcone forms (**3a** and **3b**) and also colored with bathochromic and hyperchromic shifts quinoidal forms (**4a**, **4b**), the number of the latter is determined by a number of OH-groups in the relevant anthocyanidin structure. It was established that not all anthocyanin extract types are capable to produce blue coloration after increase of pH – the molecules must have aromatic acid acylation and glycosidic radicals in positions 3 and 5 of the anthocyanidin.



ANTHOCYANINS IN DSSC

Anthocyanins do not have a toxic effect, they are safe for humans, and they are of interest as natural dyes. They are used in the food industry, cosmetics, perfumery and medicine. Nowadays, the question of the use of anthocyanins in solar cells is being widely considered. Dye-sensitized solar cell (DSSC) has attracted much attention as a new promising solar to electric convertor because of its low production cost, easy fabrication, more environmental friendliness compared to silicon or perovskite solar cell.

Anthocyanins can be produced from agricultural residues like red cabbage leaves and tulip flower heads. These anthocyanins represent low cost dye sensitizers and create possibilities for cost efficient Dye Sensitized Solar Cells.

A typical DSC includes three components: a mesoporous TiO2 film, including a photo-electrode anchored to a single layer of dye molecules on a conducting fluorine-doped tin dioxide (FTO) substrate, a volatile liquid electrolyte dissolving redox couple (I−/I3−) and a platinized FTO glass as the counter electrode.

Among the three essential components, electrolyte plays a critical role in conversion efficiency and stability of a DSC. One of the most obvious drawbacks of conventional DSCs is the use of volatile and hazardous organic solvents for electrolyte media.

The upcoming research is for optimization of the dye/TiO2/electrolyte interface where the dye is an anthocyanin and the electrolyte is a natural deep eutectic solvent.